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GUIDANCE FOR CONSTRUCTABILITY REVIEWS OF PRE-FINAL  
NAVY CONSTRUCTION CONTRACT DOCUMENTS

BY

JOHN L. SNYDER

A REPORT PRESENTED TO THE GRADUATE COMMITTEE  
OF THE DEPARTMENT OF CIVIL ENGINEERING IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF MASTER OF ENGINEERING

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## CHAPTER ONE INTRODUCTION

Constructability is defined as the ease with which a project can be built and the inherent capability of contract documents to be understood, bid, administered, and enforced. Essential for a high degree of constructability is the effective review of contract documents and resolution of identified problem areas prior to advertisement and award.<sup>1</sup>

Individuals participating in constructability reviews should have a knowledge of construction methods and techniques and experience in construction surveillance, supervision, and management. Additionally, they should be familiar with the project location, potential site related or unique problems, and application of design assumptions and principles.<sup>2</sup> As such, the Navy's Resident Officer in Charge of Construction (ROICC) offices routinely are assigned the task of performing constructability reviews. The ROICC offices are the Navy's field construction capability and normally first encounter a construction project about the time of completed bid documents or during the bid period.

This report first examines the definition of a ROICC constructability review and explores the impacts of poor reviews and causes of contract document errors. Next, a





summary and analysis of existing ROICC constructability reviewing guidance culminates in conclusions and recommendations for guidance improvements.

After recognizing the lack of extensive on-the-job experience in construction contracting that many ROICC reviewers possess, it is recommended that a thorough how-to form of constructability review guidance is needed to replace current guidance consisting of brief memory aid checklists.

The second section of this report details such a proposed how-to guide for ROICC constructability reviews. It consists of detailed reviewing guidance and illustrative examples with emphasis on just those aspects of contract documents that the ROICC is responsible to review. Also included is a step-by-step reviewing procedure to assist the inexperienced reviewer. As a whole, the guide is written and organized to stimulate thorough constructability reviews by personnel who do not have the benefit of construction contract experience. There is no substitute for experience. However, better guidance can surely reduce the time required to obtain that experience. Because of its thoroughness, the proposed guide still fulfills the role of memory-aid or checklist to assist experienced reviewers.



## CHAPTER TWO

### DEFINITION OF ROICC CONSTRUCTABILITY REVIEW

#### 2.1 Overview

There are three types of reviews performed at various stages of the design process:

1. Functional
2. Technical
3. Constructability

For purposes of context, the definition of functional and technical reviews should be understood before delineating what constitutes a ROICC constructability review.

#### 2.2 Definition of Functional Review

The intent of the functional review is to afford the customer activity its last opportunity to provide input into the design process, insofar as affecting project design parameters and functionability of the project. Typically, the functional review will be made on the 35% preliminary design submission, with the major participants being the customer, design personnel, and the cognizant customer public works representative. The review is user-oriented and is intended to finalize functional layouts and arrangements, to ensure satisfaction of intended operational





needs, and to ensure the design considers all items which will constrain construction execution.<sup>3</sup>

### 2.3 Definition of Technical Review

The intent of the technical review is to assure a comprehensive, complete, technically correct, economical, and professional design product. At the 35% stage, typically the review incorporates value engineering considerations, energy conservation measures, environmental considerations, checking for adherence to applicable state and local code requirements, fire protection analysis, and other overall design considerations. The technical review of the pre-final (95%) design submission ensures integration of the 35% comments; revalidates system selections; spot-checks for clarity, comprehensiveness and adequacy of details; validates the cost estimate and bid item structure and construction completion schedule; and cross-checks specifications and drawings. Responsibility for technical reviews rests with and is conducted by the responsible design agent (i.e., the Public Works organization or the Engineering Field Division (EFD) that accomplishes the design in-house or contracts for the particular Architect-Engineer effort). Technical reviews usually are conducted concurrent with both the 35% functional review and the 95% constructability review.<sup>4</sup>



## 2.4 The Word 'Constructability'

The word 'constructability' is somewhat of a misnomer when used in the term 'constructability review'. Constructability implies only buildability. In actuality, there are other specific considerations besides buildability with which the ROICC is charged to incorporate into his review of 95% contract documents.

## 2.5 NAVFAC Guidance

ROICC offices organizationally are subordinate to their particular Engineering Field Division. Engineering Field Divisions in turn are subordinate to the Naval Facilities Engineering Command (NAVFAC), which oversees the Navy's contract administration for all Navy construction contracts.

There are two sources of NAVFAC guidance relative to constructability reviews. The first is NAVFAC DM-6 of February 1978 (Design Manual - Drawings and Specifications). Paragraph 3.1.2.2.5 of DM-6 is as follows:

ROICC Review of Contract Drawings. The ROICC shall review plans and division 1 of the specifications during final stages of design. The review should be limited to project constructability (site problems, existing obstructions or proposed utilities, new construction methods, proposed contract time for construction and omissions which could lead to change orders or construction difficulties).<sup>5</sup>



The second NAVFAC guidance is NAVFAC Instruction 11013.29 of 12 March 1982 titled 'Constructability Reviews'. The instruction defines constructability as follows:

. . . the ease with which a project can be built and the inherent capability of the contract documents to be understood, bid, administered and enforced. Constructability encompasses a compatible design with the site, materials, methods, and field conditions as well as providing drawings and specifications free from significant design errors, omissions and ambiguities.<sup>6</sup>

The instruction leaves it up to the individual Engineering Field Divisions as to what guidance to provide construction, design, and operating personnel with regard to their respective responsibilities in performing constructability reviews. As such, the ROICC role is not specifically amplified beyond that stated in DM-6. One item of interest is that the instruction calls for constructability reviews to be performed at 35% and 95% stages of contract document preparations, but in practice, the ROICC performs his constructability review only at the 95% stage. Thus, constructability reviews are performed at the 35% stage by the responsible design agent as a part of the technical reviews.

## 2.6 Definition of Constructability Review

Through examination of constructability review guidance to ROICC's promulgated by the five Engineering Field



Divisions and one major Officer in Charge of Construction (OICC) (See Chapter 5), a more detailed understanding of a ROICC constructability review is found. The definitions from the different sources vary in clarity and extent, but an overall definition can be drawn.

The primary intent of the ROICC constructability review is to integrate into the design review process the ROICC's unique knowledge of customer and site, the ROICC's advantageous access to customer and site, and the ROICC's valuable construction experience. The ROICC is encouraged not to confuse the tenets of technical and functional reviews with what is in actuality a separate set of considerations rooted in the special expertise and access that the ROICC possesses. The most critical contribution from ROICC is the checking of all implications of site adaptation, including the following:

- minimization of customer disruption during contract execution
- verification of indicated existing site structures and conditions relative to acceptance of new work
- evaluation of adequacy of indicated and specified conditions that may affect contractor operations

Additionally, the ROICC is expected to review specified contract duration and contract timing, check buildability of designed work, and check for reflection of lessons learned





from previous experiences in contracts with similar designs and site conditions.

It should be noted at this point that one EFD requires much more than the constructability review essentially as defined in the preceding paragraphs. Western Division's guidance includes a lengthy checklist that heavily overlaps with what other EFD's generally regard as technical reviews. For purposes of this report, technical review parameters will not be considered as direct responsibilities of ROICC reviewers.



## CHAPTER THREE

### IMPACT OF INCOMPLETE CONSTRUCTABILITY REVIEWS

#### 3.1 Discussion

Several negative impacts on the ability of the ROICC organization to deliver quality contract work on time at reasonable cost can be traced back to poor constructability reviews by ROICC personnel. The impacts discussed in the following paragraphs cannot be blamed on poor constructability reviews alone, but it can be readily seen that poor reviews can contribute to the severity of the problems discussed.

#### 3.2 Change Orders

Change orders are the most obvious penalty from a poor constructability review. When a potential problem is spotted during review of pre-final contract documents, the reviewer simply identifies the problem on a form (typical EFD form is provided as Appendix A) and follows up to ensure the plans and specifications are revised to resolve the problem. If a problem is discovered during the bidding period, a formal ammendment can be initiated to incorporate the solution into the bidding package. Should a problem with the contract documents not be discovered until after bid opening, but before award, for serious problems it may be practical to withdraw the solicitation, make corrections,



and re-bid the contract. However, when the problem is discovered subsequent to award, the effort by the cognizant contract administrator or Assistant Resident Officer in Charge of Construction (AROICC) is significantly greater. Time and effort are expended for field investigations, obtaining funding authorizations, letter writing, government estimate preparation, negotiations, and writing the final change order recommendation. During each step of the change order process, something can occur to aggravate the effort: disputes, renegotiations, claims, rewrites.

### 3.3 Time Delays

Time delays to the contract completion usually accompany change orders for additional or changed work. In the case where a contractor is delayed by the government while waiting resolution of problems in the contract documents, the government frequently is liable for extended overhead, which requires tedious negotiating effort by the AROICC.

### 3.4 Poor ROICC/Contractor Relations

ROICC/Contractor relations suffer when strained by hurried changes and government-caused delays, compensation notwithstanding. Frequently the change orders are small and the allowable markup percentage does not fully compensate the contractor for his time spent estimating, meeting, and





negotiating with the AROICC. The contractor becomes more disillusioned with each change and tends to lose any hope that the affected contract can ever be considered a workable contract, especially since it was not his actions that caused the myriad of changes. Once a contract is derailed, it is hard to get it fully back on the tracks.

### 3.5 Poor ROICC/Customer Relations

ROICC/Customer relations are negatively affected by poor constructability reviews. When the customer sees delays to work involving his interest due to contract document oversights and discrepancies, he tends to conclude that the people administering the contract are not giving a full effort, or worse, that they are incompetent. With each successive and apparently avoidable change and delay, the ROICC's image is tarnished. The customer begins to believe he needs to watch the job for the government and the ROICC ends up in a defensive mode, rather than in an authoritative mode.

This situation is aggravated by disruptions to the customer's ongoing operations that could have been avoided with proper planning considerations. The customer typically fails to see the humor in or excuse for contract documents that demonstrate poor planning to a degree he would not allow in his own planning efforts.



### 3.6 Poor ROICC/Public Works Relations

ROICC/Public Works relations get strained when it is perceived that one or the other party repeatedly does not do as thorough a job as should be done in reviewing contracts before advertisement. AROICCs tend to feel slighted when they have to do all the work in processing a change order that Public Works could have prevented by observing their change requirements during constructability review. Public Works may then perceive the ROICC as whining and trying to avoid work. Public Works takes abuse from the customer for contract delays whether they were caused by ROICC errors or not, another source of ill feeling.

### 3.7 Increased Contract Price

When something is left out of the specification or plans and it must be added by change order, it will cost more than had it been a part of the original competitively bid contract package. Delay costs result in nothing tangible, as are the costs associated with rework and compensation to the contractor for delays. All of these types of expenditures take away from the available funds of the construction dollar yet result in no useful facility improvements.



### 3.8 Increased Bid Prices

Bid prices can be influenced by bidders' experiences with previous Navy contracts. As do certain design firms, field offices get reputations for high incidences of defects in contract documents. When bidders come to expect probable losses due to resolving contract defects, they will increase the contingency portion of their future bid prices to compensate.

### 3.9 Wasted ROICC Staff Time

ROICC staff time is wasted resolving problems caused by previous constructability reviews that were inadequate. Processing avoidable change orders and time extensions, arguing avoidable disputes, and resolving unnecessarily damaged relationships consumes time that should be spent ensuring that the other 95% of contract expenditures result in quality construction. The resolution of past contract reviewing errors takes away time needed to review future contracts, thus continuing an endless cycle of wasted effort.



## CHAPTER FOUR SOURCES OF CONTRACT DOCUMENT ERRORS

### 4.1 Existing Deterrents

It is not immediately clear how errors and omissions survive a system which includes the following components:

- Designers, both in-house and outside civilian Architect/Engineer (A/E) firms, are directed to perform internal quality assurance checks prior to submission of plans and specifications for Navy review.<sup>7</sup>

- A/E firms are warned that they remain liable for all costs incurred by the Government as a result of inadequate or negligent performance of any services furnished, despite any review, approval, or acceptance by the Government.<sup>8</sup>

- ROICCs are directed to report to the Engineering Field Divisions (EFDs) any A/E substandard performance by means of performance evaluations, which are in turn used in future A/E selections.

### 4.2 Causes of Errors

Based on observations and candid conversations with designers and A/E's on numerous contracts, the following is a subjective list of factors this author considers reasons that contribute to constructability errors:





(1) Designers have little experience in construction and the impacts that can be suffered by customer activities and contractors due to poorly planned site restrictions.

(2) Designers emphasize technical accuracy and give little thought to how the contract work is to be accomplished much less the effects of the contract work on a customer.

(3) Designers fail to comprehend the time and effort that even minor change orders consume and thus do not appreciate the need for contract documents to be more than technically correct.

(4) Designers have limited contract experience which results in poorly worded or weak, unenforceable contract requirements.

(5) A/E's depend too heavily on government reviews.

(6) Designers resist placing restrictions on contractor scheduling and operations.

(7) Designers send inexperienced assistants to sites for detailing existing site conditions.

(8) Reviews made by independent associates do not include site visit. In other words, the quality assurance check performed prior to design submission does not involve more than a desk check.

(9) A/E fees are negotiated as tightly as possible, not giving much incentive to save government reviewers from discovering errors, or to validate asbuilt drawings.



(10) During a site visit by the design team or its representatives, customer and designer fail to communicate as to customer needs during construction.

(11) Designers depend too much on Guide Specifications and do not adequately tailor them to meet the requirements of the particular contract.

(12) Guidance to designers relative to considering customer operational conflicts, contractor needs, and existing site conditions is general in nature and does not provoke detailed analysis.

(13) ROICC personnel do not accurately reflect poor A/E performance in evaluations.

#### 4.3 Summary

The above listing is not necessarily complete or accurate, and is provided only to demonstrate the large variety of reasons that errors and omissions regarding constructability can occur in plans and specifications.



CHAPTER FIVE  
SUMMARY OF PRESENT EFD LEVEL GUIDANCE

5.1 Summary of Guidance

Guidance from five Engineering Field Divisions (EFD), one Echelon IV Officer in Charge of Construction (OICC), and the Civil Engineer Corps Officer School (CECOS) Contract Administration Course are herein briefly summarized, to show the extent of existing EFD level guidance.

5.2 Atlantic Division, Naval Facilities Engineering Command

Source: LANTDIV INSTRUCTION 4121.1D of 14 July 1978

Summary: Directs constructability review at pre-final design stage; technical review discouraged; encourages identification of lessons learned from previous experiences with similar designs or materials; brief checklist provided, randomly organized.

Source: LANTDIV ROICC Handbook

Summary: Provides brief checklist, essentially covers LANTDIVINST 4121.1D checklist.

5.3 Southern Division, Naval Facilities Engineering Command

Source: SOUTHNAVFACENGCOMINST 11012.10A of 3 April 81





Summary: Directs constructability review at pre-final design stage; technical review discouraged; comments on lessons learned encouraged; brief checklist provided, randomly organized.

#### 5.4 Chesapeake Division, Naval Facilities Engineering Command

Source: CHESNAVFACENGCOMINST 11012.5A of 23 March 82

Summary: Directs constructability review at pre-final design stage; technical review discouraged; lessons learned comments encouraged; good definition of constructability review included.

Source: CHESNAVFACENGCOMINST 4330.62C

Summary: Provides brief checklist, randomly organized.

#### 5.5 Officer in Charge of Construction, Trident

Source: ROICC Handbook

Summary: Directs constructability review at pre-final design stage; technical review discouraged; lessons learned comments encouraged; brief checklist provided, randomly organized.



## 5.6 Western Division, Naval Facilities Engineering Command

Source: ROICC Handbook

Summary: Directs constructability review at pre-final design stage; checklist provided is lengthy, includes constructability items and extensive technical review items, organized by contract divisions.

## 5.7 Pacific Division, Naval Facilities Engineering Command

Source: PACNAVFACENGCOM INSTRUCTION 4330.34A

Summary: Directs constructability review at pre-final design stage; technical review discouraged.

Source: OICC FAR EAST INSTRUCTION 4330.1 of 14 Jul 82

Summary: Directs constructability review at pre-final design stage; technical review discouraged.

Source: OICC SOUTHWESTPAC ROICC Handbook

Summary: Directs constructability review at pre-final design stage; technical review discouraged; brief checklist provided, randomly organized.

Source: OICC Marianas ROICC Handbook

Summary: Directs constructability review at pre-final design stage; technical review discouraged; brief checklist provided, randomly organized.



## 5.8 Civil Engineer Corps Officers School

Source: Construction Contracts Administration Course  
(1984)

Summary: Brief checklist provided, includes both items  
of constructability and technical review  
considerations.



## CHAPTER SIX CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Reviewer Experience Level

The abilities of personnel performing constructability reviews at ROICC offices vary. Some ROICC offices assign the reviewing task to the AROICC/Assistant Resident Engineer in Charge of Construction (AREICC) which may be a Civil Engineer Corps officer ranging from ensign to lieutenant commander or perhaps a GS11 to GS13 civil service engineer. Other ROICC offices assign the reviewing task to the civil service construction representative, whose primary responsibility is that of field surveillance of construction work. AROICCs and AREICCs frequently have little or no construction field experience or contracting experience when first assigned to their position and usually rotate every two to three years. Construction representatives more often have the construction experience but may lack Navy contracting experience when they start their job; turnover rates vary. It can be reasonably concluded that a 95% design submittal stands a relatively high probability of undergoing a ROICC office constructability review by someone with a level of construction contracting experience less than optimum.





## 6.2 Overview of Present Guidance

As can be seen in the previous chapter, present constructability review guidance from EFDs and OICCs consists primarily of a directing policy and a brief checklist of topics to review, and is promulgated by formal instruction and/or as a part of a ROICC handbook.

## 6.3 Conclusions

The net effect of existing guidance is that of providing a memory aid type checklist for the experienced reviewer, not so much a how-to manual for the inexperienced reviewer. The ultimate beneficiary of constructability review guidance should be both the potential first-time reviewer, as well as the experienced reviewer.

Guidance that does not satisfy the needs of the inexperienced reviewer gives the beginner only a general picture of what is needed and not tools with which to draw in the details. This gap is critical because no ROICC office has the luxury of experienced personnel free to train newcomers in the art of constructability reviews without benefit of useful written aids.

Until expertise drawn from experience is obtained, it is concluded that the lack of sufficient how-to constructability review guidance manifests itself in the



form of ineffective constructability reviews. Discussion with various EFD construction division personnel confirms that personnel are unable to produce effective reviews until they have gained many months of experience. Interim reviews potentially result in the many negative impacts identified in Chapter 3 of this report.

#### 6.4 Recommendations

What components should be included in a how-to guide for ROICC constructability reviews? Following this chapter is an extensive proposed how-to type guide for constructability reviews which expands on existing guidance. To illustrate its intended benefits, the following is a list of perceived problem areas inexperienced reviewers suffer and how features of the proposed guide should alleviate those problems.

Problem: Inexperienced ROICC reviewers are unable to translate existing brief checklists into specific questions that should be asked when reviewing a particular contract.

Remedy: The Guide provides comprehensive detailed discussions for areas of most important reviewing responsibilities: control of impact on customer, allowances for contractor needs, checking existing site structures and conditions, public works interest items,



and evaluation of contract duration and timing. Examples of problems are provided, and the reviewer is guided as to where to look in the contract documents and what solutions to make sure the documents consider.

Problem: Present guidance does not address issues such as comment writing skills, appropriate level of reviewing effort, importance of expertise of others, and professional responsibility to review for wasteful contract scope.

Remedy: Chapter 2 of the Guide (General Guidance) includes discussions of issues listed plus others.

Problem: Inexperienced reviewers are unfamiliar with efficient reviewing techniques.

Remedy: A step-by-step procedure is offered in Chapter 3 of the Guide (Recommended Procedure).

Problem: Reviewers do not emphasize site related constructability reviews, despite guidance to the contrary.

Remedy: General guidance to technical reviewing is included in Chapter 9 (General Guidance) of the guide. The reviewer is advised that the guidance is provided primarily for purposes of exposure to technical reviewing concepts.



Problem: Due to an inability to comprehend engineering drawings and contract specifications and the lack of construction experience, the customer is unable to visualize the proposed work and how it will affect his ongoing operations.

Remedy: The Recommended Procedure chapter of the guide emphasizes the importance of the customer's role and Chapter 4 (Minimizing Customer Disruption) of the guide details an extensive list of considerations with which to check contract documents for adequate restrictions on the contractor.

Problem: Reviewers do not make the time available to perform adequate reviews.

Remedy: Chapter 1 (Basic Philosophy) of the guide emphasizes the priority that constructability reviews should receive.

## 6.5 Promulgation

It is recommended that the Construction Division within each EFD and Echelon IV OICC review the proposed guide that follows and consider publishing the guide for ROICC use. Published guides could take the form of an individual informal publication, a chapter to existing ROICC manuals, or as an updated enclosure to existing formal instructions.





## PROPOSED ROICC CONSTRUCTABILITY REVIEWING GUIDE

(Note: Chapters 'GUIDE CHAPTER ONE' through 'GUIDE CHAPTER NINE' and pages G-1 through G-64 constitute the proposed guide.)



## GUIDE CHAPTER ONE BASIC PHILOSOPHY

### 1.1 Relative Importance

There is no immediate payback for performing a thorough constructability review. The designer usually will not thank the reviewer for uncovering flaws in his product. Routine problems may pile up while the reviewer accomplishes the reviewing task. Urgent problems undoubtedly will rudely interrupt the reviewing effort, making the constructability review appear less important. But in reality, the constructability review should be considered one of the most important tasks construction managers perform.

### 1.2 Avoidance of Problems

Constructability reviews of proposed construction contracts are the most direct avenue to the prevention of change orders, delays, disputes with contractors, unhappy customers, and poor ROICC and Public Works images. Problems with contract documents identified prior to advertisement during constructability review are easily resolved - just communicate the problem to the designer and ensure the documents get corrected. During the bidding period, problems can be resolved by issuance of formal amendments. After bid opening but before award, there is the option of



withdrawing the solicitation, making corrections to the contract documents, and re-bidding the contract. Once the contract is awarded, however, all errors, ambiguities, and omissions are permanently a part of that contract. Like incubating monsters, those defects will surely rear their ugly heads some day, creating disruption, hate, and discontent, and the little monsters feed on the commodity ROICC personnel cherish most - time.

### 1.3 Time Savings

The time spent performing a thorough constructability review should be considered an investment. The time saved by each avoided dispute, change order, and delay, plus the prestige that is saved add up to the payback. It is estimated that about 35% of total effort is spent to resolve contractual errors and omissions that could have been found via thorough constructability reviews. It is estimated that performing the essential components of a constructability review for all contracts would take less than 10% of an AROICC's total effort. Therefore, thorough constructability reviews should free up some 25% of an AROICC's time that can be better directed toward active management of contracts versus the former reactive style.



## GUIDE CHAPTER TWO GENERAL GUIDANCE

### 2.1 Organized Approach

For effective performance of constructability reviews, the reviewer requires an organized method of attack. There exists an infinite number of considerations in checking the completeness of contract documents. Haphazard scanning of contract documents may result in identification of some errors or omissions, but an equivalent investment of time will be much more effective when steered by organized procedures and guidance. That guidance of reviewing considerations should be detailed to reflect the relative emphasis of each area of consideration commensurate with higher authority tasking.

### 2.2 Areas of Emphasis

This guide is based on the assumption that the reviewer's primary task is checking the adequacy of contract documents with regard to all implications of site adaptation including the following:

- minimization of customer disruption during contract execution (Chapter 4)





- verification of existing site physical features relative to acceptance of new work, feasibility of new work, and difficulty of new work (Chapter 5)

- satisfaction of contractor site requirements (Chapter 6)

Additional topics of high emphasis for which detailed guidance is provided are the following:

- Public Works interest items (Chapter 7)

- contract duration and timing (Chapter 8)

The last chapter (Chapter 9) provides discussion of reviewing considerations primarily the responsibility of technical design reviewers outside the ROICC realm. ROICC reviewers, though not directly pursuing such topics, should be aware of them and make comments on any discrepancies in these other areas discovered while reviewing their own particular areas of emphasis.

### 2.3 Procedure

A recommended step-by-step procedure for performing a ROICC constructability review is provided as Chapter 3.

### 2.4 Key Point of View

Review not only what is there in the contract documents but review for what should be there.



## 2.5 Level of Effort

All reviews should be as thorough as possible, but certain factors dictate that extra effort be afforded to a particular contract to uncover and resolve all possible problems:

- Contract work represents a high priority to mission requirements of customer.

- Customer was 'victim' of prior problem-ridden contract.

- Architect/Engineer firm or designer has poor reputation due to lack of thoroughness or particular weaknesses.

- Potential of customer disruption for particular contract scope is high.

- Appearance of documents indicates poor level of professionalism.

- Contract work depends heavily on accuracy of depicted existing conditions such as large multi-trade repair contract.

## 2.6 Communicating Review Comments

Reasonable effort should be made to communicate review comments in a clear, concise, and easily understood manner. Specifications should be referenced to the exact paragraph



or subparagraph and sentence; problems on plans should reference drawing number, note number, or detail number. If rewording is recommended, a brief phrasing of the recommended new wording should be provided. For problems on plans, it may be more efficient to make a rough sketch or a quick copy of the particular detail and mark it up to show the problem. Attempt to organize comments such that all comments relative to a particular specification section or drawing are grouped together. Avoid comments being no more descriptive than 'paragraph unclear', 'specification conflicts', or 'contract duration too short'. Be specific and explain the basis of the perceived problem.

Avoid spending time doing things that the designer should be held responsible to do, but not at the expense of poorly communicating the problem. For example, if obstructions are observed at the site that need to be added to the drawings, the reviewer should clearly explain the problem, but the designer should be the one responsible for taking additional measurements necessary to revise the drawing. Similarly, if a specified item of work is not possible, the reviewer should clearly explain why and make recommendations if any are known as to an alternative, but leave it to the designer to work out the details.



## 2.7 Expertise of Others

If the reviewer is unfamiliar with the implications of a particular construction method or is unsure whether a particular wording is acceptable, he should consult with others who may have the necessary expertise: construction representative, supervisory civil engineer, contract specialist, AROICC, or EFD area manager.

## 2.8 Professional Responsibility

Though not specifically required, it is the professional responsibility of the reviewer to comment on any proposed work that appears to be wasteful, unnecessary, or incomplete. It is unlikely such instances survive other checks in the procurement system, but it is possible that all or part of a proposed contract scope is based on an erroneous evaluation of facility deficiencies, or that contract scope is no longer up-to-date. It may be that certain repair work (particularly painting) has been recently performed by station or self-help forces. Discussions with customer personnel may reveal that a particular item of work is to support a function that has just changed or is soon to change. Question items of work that appear unnecessary or poorly planned; it should not be assumed that there is always a justification for what does not make good sense.





## 2.9 Infusion of Lessons Learned

Lessons learned from problems experienced in previous contracts and from general construction experience serve as some of the most valuable 'checklist' items when reviewing a proposed contract. Lessons learned may originate from previous 'buildability' problems, knowledge of poor service life of work utilizing similar design features, or contract enforcement difficulties resulting from previous use of similar contract wording.

## 2.10 Followup

Sending in the resultant comments of a constructability review is not the last step to resolving identified problems. As soon as final contract documents are received, the reviewer should check that all comments have been satisfactorily resolved. Most design agencies strive to inform the reviewer why no action is taken on particular comments, but if not so informed, the reviewer should immediately seek the reasons from the responsible authority. A ROICC has the authority not to advertise any locally originated contracts with which he has objections, but for EFD advertised contracts, the ROICC ultimately must convince appropriate EFD personnel as to the particular objectionability of contract documents.



For purposes of checking final contract documents, the reviewer should ensure that a complete copy of review comments is kept in ROICC office files.

## 2.11 Turnover

A copy of this reviewing guide should be provided to replacement personnel, marked-up to reflect additional guidance gained from lessons learned from change orders or problems. Important information about particular customers, sites, and designers gleaned from past contract experiences should be made available at turnover.



GUIDE CHAPTER THREE  
RECOMMENDED PROCEDURE FOR ROICC CONSTRUCTABILITY REVIEWS

STEP#	TASK	ESTIMATED TIME	
		SMALL	LARGE
1	Review plans and specifications to develop overall understanding of project location and scope, types of work, and types of materials.	20m	2hr
2	Flag specified and indicated restrictions on contractor operations using Guide Chapter 4 guidance. Delay reviewing completeness of restrictions until Step 6. Flag contract documents with unique colored pen and/or paper clips.	10m	1hr
3	Flag all references and notes regarding physical site conditions and structures using Guide Chapter 5 guidance. Flag with unique colored pen and/or paper clips.	10m	30m
4	Review contract documents relative to contractor site requirements using Guide Chapter 6 guidance. List items to check during site visit (Step 6).	10m	30m
5	Review contract documents for Public Works interest items using Guide Chapter 7 guidance. Coordinate with Public Works.	10m	30m



6	Schedule and meet with Customer representative and get familiarization of customer operations and needs that may be affected by contractor operations, using Guide Chapter 4 guidance to ensure all areas are discussed. Determine if flagged contract restrictions are adequate.	1hr	1hr
7	After meeting with Customer, while still at site, perform review of depiction of physical site conditions, using Guide Chapter 5 guidance. Check all flagged references and determine if adequate. Also check items relative to contractor site requirements from Step 4.	1hr	2hr
8	Finalize review comments regarding any inadequate controls against customer disruption, inadequate depictions of physical site conditions, inadequate considerations of Public Works interest items, inadequate considerations of contractor site requirements, contract duration (see Guide Chapter 8 guidance), or any other observed discrepancies.	1hr	1hr
		<hr/> 4hr	<hr/> 8hr





COMPARISON: The estimated average processing time of one change order including site investigation, preparation of government estimate, negotiation, and writeup is 4 hours, not including staff time by inspector, typists, clerks, etc.



## GUIDE CHAPTER FOUR MINIMIZING CUSTOMER DISRUPTION

### 4.1 Definition of "Customer"

In the Navy, ROICC and Public Works organizations are to be responsive to the base commanding officer as well as all tenant commands. Hence, the "customer" is not only the activity for whom the proposed contract is to directly benefit, but also anyone else who may be affected by the work. In some cases, the customer may be Public Works itself, such as a contract for steam plant improvements. A special set of criteria must be considered to achieve the goals of preventing unnecessary disruption and minimizing those disruptions that are necessary.

### 4.2 Use of Restrictions

To identify all implications of contract execution upon the "customer", the reviewer must look not only at what the final product of the proposed contract is to be but more at how the potential contractor is going to accomplish the work necessary to achieve that final product. The reviewer must concurrently envision the needs and priorities of the customer, thus necessitating an intimate understanding of the customer's operations. By looking at the 'big picture' of contract execution consisting of the two basic



parameters, contractor operations and customer operations, the reviewer is in a position to determine points of interface where disruptions are likely to occur. In order to minimize disruption to the customer, the reviewer must check to see that contract documents place adequate restrictions on the contractor's operations to control those identified areas of interface.

It should be noted that the absence of any restrictions placed upon a contractor will probably result in the lowest bid price because restrictions often mean more cost to a contractor. For this reason, the reviewer should not casually propose to add numerous restrictive contract requirements, but rather, the reviewer should exercise good judgement in deciding the need of proposed restrictions. The alternative which would result in no restriction to the contractor should always be considered first.

#### 4.3 Where to Find Contract Restrictions Intended to Control Customer Disruption

Places to check in the contract documents are Specification Sections 01010 (General Paragraphs) and 01011 (Additional General Paragraphs) and notes in contract drawings and paragraphs in technical specification sections relative to scheduling, notice requirements, and restrictions to application and erection methods.



#### 4.4 Specific Guidance

Guidance for reviewing a contract for satisfying customer needs with respect to minimization of disruptions and ease in transition to the finished work is provided in detail in the paragraphs that follow.

The format of the guidance under each subparagraph is as follows:

Need: (brief description of typical customer need)

Example: (examples of contract conflicts with need)

Reviewer:(guidance on where to check for resolution of customer's need in contract documents, and suggested remedies that may have to be added)

##### 4.4.1 Customer Use of Spaces Included in Contract Area of Work

Need: Spaces included in the area of work must remain occupied by the customer during contract work.

Example: Contract is for miscellaneous repairs in administrative spaces and it is unreasonable for the spaces to be vacated.

Reviewer: Ensure essence of NAVFAC Guidespec 01011.14.2.1 and 01011.14.2.4 are included in specifications.





Need: Certain areas are to be vacated or certain items must be removed by the activity prior to work start.

Example: Activity is having to temporarily relocate their function to another area during the contract work, and they do not want to commence the inconvenience until the contractor is ready to start. An example would be asbestos removal work.

Reviewer: Ensure the following requirement is included in the Special Scheduling Requirements paragraphs in Section 01011:

"Before work is started in (specify space), at least (#) days advance written notice must be provided to the Contracting Officer."

Reviewer should check to ensure that the number of days specified allows enough time for the AROICC to contact the activity about the notice, for the activity to make necessary arrangements for the move, and for adequate time to enable the move itself. Reviewer should also check for compatibility of this requirement against the specified contract duration.

Need: Certain areas must be worked and completed before work may commence in another area.

Example: Repair work is of a nature requiring the activity to vacate the spaces, such as for new floor covering. The activity can vacate only a few rooms at a time and once one area is completed, they then move into the



newly worked rooms and thus free up other rooms in the contract to receive new floor covering. Another example would be a shower repair contract where it is desirable to ensure that all showers are not worked at the same time to enable residents to still bathe during the contract duration.

Reviewer: Ensure essence of NAVFAC Guidespec paragraphs 01011.14.2.2 and 01011.14.2.4 are included in the Special Scheduling Paragraphs. Additionally, a requirement essentially worded as follows should be considered:

"There shall be a minimum of ( ) working days between the time work is accepted by the Contracting Officer in ( ) and when work may start in ( )."

The above requirement should be included in the paragraph corresponding to Guidespec 01011.14.2.2 when the activity needs time to accomplish their relocations.

Need: It is critical that work in a certain area be performed from start to finish in a maximum period of time.

Example: A contract is for overlaying an aircraft runway. The runway outage results in reduced training operations that must not be affected any more than absolutely necessary.

Reviewer: Critical scheduling constraints should not be handled in the Special Scheduling Paragraphs as were the above situations, but rather, they should be identified in



the specifications concerning contract duration and liquidated damages. The requirements are then reflected in the award letter and contract forms such that there can be no confusion on the part of the contractor as to the importance of the scheduling requirement and the penalty that can be expected if the conditions are not met. Guidespec paragraphs 01011.1 and 01011.2 apply and should be adjusted if multiple dates are necessary such as when more than one runway is involved.

Need: Customer must reserve ability to use contractor's area of work for a certain period of time when the need arises.

Example: An X-Ray hangar building is the only available place that X-Ray of possible cracked aircraft wings can be accomplished safely. There is a contract to repaint all surfaces of the building. When X-Ray work is underway, contractor personnel must vacate the building. The customer cannot schedule the X-Ray activities any closer than one working day in advance, but past history has shown that no more than 5 working days (separate, not consecutive) of X-Ray activity will occur during the contract period of 45 days.

Reviewer: Ensure that the requirement, if absolutely unavoidable, is covered in the Special Scheduling Paragraphs



in Section 01011. For the above example, the following wording would be used:

"Throughout the contract period, there will be a maximum of ( ) working days when the Contractor must vacate the building to allow activity use of the building. The contractor will be given a minimum of one working day advance notice by the Contracting Officer for each such occurrence, and the contractor must remove all of his materials and equipment from the site no later than closing time the day before the scheduled outage."

#### 4.4.2 Incremental Beneficial Occupancy Dates (BOD)

Need: It is preferable to have major portions of the work turned over to the using activity before the entire contract work is completed (similar to the situation in the paragraph above for runway scheduling).

Example: A contract is for providing two new barracks buildings. It has been estimated that it will take at least 60 days to move all furnishing into the two buildings to enable occupancy by residents. If the activity received one building a month before the other, the move-in effort would be greatly simplified and occupancy could be effected sooner.

Reviewer: Guidespec paragraphs 01011.1 and 01011.2 must reflect this requirement. Reviewer should check to ensure the buildings are delineated to be completed to the degree the activity requires. Is it necessary that all common systems to the two new buildings be completed also, such as air conditioning, steam, fire alarm, phone wiring,





intercom and such? Also, it should be determined whether ancillary structures must be finished to enable the first building's use, such as parking lots to stage container vans for furniture storage and unpacking.

#### 4.4.3 Access to Work Spaces

Need: All of customer's spaces occupied by the customer during the work, whether inside the area of work or outside the area of work, must have access maintained.

Example: Contracts may require floor work, removal and erection of walls and doors, or other activities that require blocking hallways, doorways, loading docks and such.

Reviewer: First, establish what types of access are required. Check if frequent deliveries occur and, if so, check for means of access without stairways if possible. Determine whether, as a whole, access can be maintained for all occupied spaces by closely reviewing the scheduling restrictions, sequence of work restrictions, delineated work areas, and the location of indicated construction and demolition. Fire exits must be maintained. Access problems can be solved by specifying temporary closures and openings, by requiring certain work such as door replacements to be done after hours or on weekends, by relocating the activity temporarily, or by specifying a specific sequence of work.



#### 4.4.4 Parking Areas

Need: Adequate parking areas and access to same must be maintained throughout contract duration.

Example: Contract may infringe upon customer parking needs in various ways: new facility or facility addition may be built where all or part of a parking lot presently exists, the indicated contractor's laydown area or access thereto may include part of existing parking lots, or certain contractor operations may consume parking lot spaces, or restrict parking lot access.

Reviewer: Check main Site Plan and also electrical and mechanical site plans. Determine if customer can mitigate temporary parking area displacements by utilizing nearby areas. If alternate parking is especially inconvenient, check that contract wording minimizes the disruption by scheduling restrictions that place limits on the duration of the contractor's work in the parking area. By using special scheduling restrictions on a new facility or facility addition contract which both consumes existing parking and provides new parking, it may be feasible to require that the new parking lot construction be completed before the existing parking lot is used or demolished. One consideration when specifying scheduling restrictions on parking lot construction is to spell out that the marking of parking spaces is a necessary part of the specified parking



lot completion to be accomplished before acceptance. For facilities with night time activities, provisions for parking lot lighting, either temporary or early completion of permanent, should also be included.

Reviewer should also ensure that egress to and from parking lots is not unnecessarily disturbed. Utility crossings should be required to not restrict too many entrances or exits at the same time. After hour or weekend scheduling may be an option.

#### 4.4.5 Access to Building

Need: Adequate building access must be maintained during contract duration.

Example: Contract work may adversely affect building access when work involves building entrances, parking lot changes, or certain contractor operations around entrances.

Reviewer: When any work affecting the parking lot or building entrances is included in the contract, check that there remain satisfactory means of transiting from parking area to and from building entrances. Additional new sidewalks may be necessary when long term changes occur, such as when workers must find a way from a new parking lot to the existing building while a large addition in between is constructed. Extended pedestrian use of streets and lawns is to be avoided. Check that utility crossings



through sidewalks are satisfactorily resolved via scheduling restrictions or temporary structures.

#### 4.4.6 Security

Need: Certain activities have special security requirements that necessitate passes and/or escorts for contractor personnel beyond that of the front gate pass that a standard paragraph in Section 01011 delineates.

Example: Contracts may involve work at airfields, munition storage areas, or classified areas.

Reviewer: Check for additional check-in procedures or escort requirements at the activity and ensure Section 01011 also describes such in sufficient detail that bidders can reasonably estimate the time that will be lost during such procedures. Description should identify where the check-in points are located, the procedure, what type identification is required, whether there is a limit to the number of escorts and the number of crews that can work at the same time, the check-out procedure, and to what level the procedure is to be duplicated each working day. Provide as much detail as possible but avoid specifying the time that the security procedures will consume. Limitations on vehicle access should be similarly described.

Watch for whether peculiar security requirements are identified for spaces where new work penetrates into a





secure area or wiring, piping, or other support systems traverse secure areas.

#### 4.4.7 Disruption to Utilities and Support Systems

Need: Disruption to any and all support systems and utilities must be minimized.

Example: Connections may be required to electrical, water, phone, fire alarm, intercom, HVAC, security systems, and other systems that result in downtime to the activity until the system is restored.

Reviewer: A good Guidespec paragraph regarding utility connections can be found in Section 01011, paragraph 14.2.5. The most common misuse of this paragraph is to believe that a fire alarm system internal to a facility or an HVAC component is defined as a utility, and therefore the connection thereto is covered by that paragraph. The term 'utility' usually is interpreted to mean exterior water, power, and telephone. Reviewer should check that special restrictions are also specified for any connection to a vital support system not classified as a utility that results in downtime of the system (paragraph for utilities can be ammended to cover). Ensure that the 15 days provided for in the guidespec is sufficient to enable Public Works and activity scheduling of the outage.



Overuse of this type of scheduling restriction can cause disruption intended to be avoided. It may be preferable to the activity to have the outage during normal hours if the outage is short in duration. This may save unnecessary overtime to the activity and Public Works, as well as to the contractor. Ensure that effects of outages during normal hours are understood by the customer such as loss of toilet flushing during building water outage or loss of computer use during air conditioning outage.

#### 4.4.8 Compatibility with Contractor Operations

Need: Contractor movements need certain restrictions.

Example: Certain vehicle movements around aircraft operating areas require cleanup immediately following any tracking of mud or dirt.

Reviewer: Contractors can be required to use only specific entrances for control purposes. Ensure such requirements are adequately reflected in Section 01011 scheduling and security paragraphs.

Need: Contractor erection or application methods require restrictions.

Example: Use of large cranes may interfere with transmitting or receiving radio signals; painting exterior of existing hangar by spray methods may result in overspray damage to numerous aircraft parked nearby; spray painting a



building may result in overspray damage to privately owned vehicles in adjacent parking lots.

Reviewer: Check applicable technical specification section for inclusion of necessary restrictions. The crane usage situation may be unavoidable but the disruption may be minimized by requiring after hours work or notice requirements. The painting situations may be similarly resolved but it may be necessary to prohibit the use of spray applicators. Restrictions or prohibitions on erection or application procedures should be included in the applicable technical section; scheduling restrictions for a particular method if used should be also referenced in Section 01011 Special Scheduling Paragraphs.

Need: Contract work needs to be temporarily closed off from other occupied work areas to prevent noise and dust disruptions.

Example: Contract work is in an area adjacent to an occupied area where no wall separates the two, and no new wall or partition is a part of the work.

Reviewer: Check Section 01011 for inclusion of Guidespec paragraph 14.2.4. For situations calling for large closures (a floor to ceiling plywood partition, for example), the requirement should be detailed on the plans and the location should be clearly indicated because the paragraph from the Guidespec is too generic by itself to



force such contractor expenditures. Consideration should be given to specifying what work the erection of the partition must precede.

#### 4.4.9 High Visibility Areas

Need: Maintain high visibility areas in as pristine a state as possible, for as long as possible.

Example: Contract may call for trenching along highly traveled streets or grading operations around front gates or other such high visibility areas.

Reviewer: Ensure Special Scheduling Paragraphs reflect the need to have backfilled trenches or newly formed swales dressed and seeded or sodded immediately following new work, or whatever other restrictions that will enable enforcing prompt cleanup and dressing up of disturbed areas. Keep in mind any specific areas of attention that the base commanding officer has previously expressed.

#### 4.4.10 Roadwork and Parking Area Work

Need: Interference to base traffic patterns and parking areas must be kept to a minimum.

Example: Contract may be for resurfacing roads and parking areas affecting several activities.

Reviewer: Check contract documents for scheduling restrictions. Considerations may include doing only one





lane at a time, closing off whole sections of roads and rerouting traffic, and limiting the areas allowed to be worked concurrently. Special attention should be given to ensuring contract restricts contractor from believing he may work too many roads or parking areas at the same time. Considerations should be included to require certain minimum notice, flagmen, signs both the day before and on the day of work, prompt repainting of road and parking lines, and possibly requiring weekend work.

#### 4.4.11 General Notes

1. For ease in drawing preparation, some designers do not number rooms in the contract drawings in the same manner as the rooms are actually numbered. Reviewer should always check that the numbering system or nomenclature for spaces referred to in scheduling paragraphs corresponds to that used in the contract drawings.

2. Ensure that the paragraph corresponding to Guidespec 01011.14.1, which contains the normal working hours of the activity, is accurate and takes into account night and weekend schedules of activity and of other activities that may use the building for night classes or such.



GUIDE CHAPTER FIVE  
VERIFICATION OF SITE CONDITIONS

5.1 Discussion

This section provides guidance to enable effective verification of the depiction of existing physical site conditions. The previous section relative to customer needs relates to intangible operational conflicts between contractor and customer; this section deals with reviewing contract documents for depiction of tangible site conditions that bear directly on contractor operations, work feasibility, and difficulty of work. It is essential again to have an understanding of contract scope, work types, planned materials, and probable construction methods prior to commencing review.

Typically, it is the ROICC office alone that performs a review of depicted physical site and environmental conditions. Designers tend to investigate a site only to the extent necessary for technical design purposes, contractors seldom check physical site conditions, and other government reviewers do not have the expertise or access, much less tasking. As such, the review by necessity should be as thorough as possible, to identify preventable 'changed conditions'.



The terms 'differing site conditions' and 'changed conditions' are used interchangeably. In fact, the site does not change. The terms refer to situations in which construction conditions turn out to be different than those represented in the contract documents, or from what the parties to the contract could reasonably have expected from the information available.<sup>9</sup>

The Navy's differing site conditions clause allocates the risk of unforeseen site conditions to the Navy. There is however a requirement in the typical Solicitation (Invitation for Bids) that purportedly requires the bidder to examine the site and ascertain prevailing site conditions. This site examination requirement however is generally considered by the courts to be exculpatory with respect to physical site representations and as such is not a means to transfer liability to the contractor for omissions or errors.<sup>10</sup>

## 5.2 References to Existing Site Conditions in Contract

In the General Paragraphs, there are usually some requirements for new work around existing work, connections, and excavations. There also are various places in the plans and technical specifications to look for items dependent on validity of physical site conditions. Each technical specification section should be checked for instructions



such as "match existing" color, grade, texture, etc.; "preparation of (existing) surfaces"; "connections to existing"; and "existing facilities to be removed". "Scope of work" and "description of work" paragraphs should be checked for references to work on existing structures, particularly in specification sections for demolition and removal, asbestos removal, pavement removal, and specification sections for various finishes, such as painting, flooring, accoustical treatments, and tile. In contract drawings, most references will be found on drawings including site layout, civil work, mechanical site plan, electrical site plan, and fire protection plan. All drawings should be checked for references to or notes about existing structures or conditions, with particular attention paid to demolition work and adaption of new work to existing work.

### 5.3 General Verification Guidance

Verification criteria, common to the proper depiction of all physical site features, include the following:

1. material type and description
2. location
3. dimensions and thickness
4. size
5. condition





All depictions of physical site features should be checked against the above basic criteria. To supplement the above, guidance is necessary for checking the completeness of contract work requirements relative to existing site features as well as checking completeness of site representations relative to difficulty of work, feasibility, and obstructions.

#### 5.4 Specific Verification Guidance

In the following subparagraphs, physical site features are organized into three basic categories:

1. Existing items to be removed, demolished, or relocated
2. Existing items that new work connects to, adapts to, or accepts new work
3. Obstructions

Specific items of consideration are listed for each category and subcategory to guide checking completeness of site representations and completeness of contract work relative to existing site features.



#### 5.4.1 Existing Items to be Removed, Demolished, or Relocated

##### 5.4.1.1 Items to be Removed and Relocated

a. Verify location to be relocated to: should be indicated if inside area of work; described and distance provided if not in area of work.

b. Check desirability and availability of government weight handling equipment and operator.

c. If an item of equipment, check for provisions of new connections and removal of old connections.

d. If an item of equipment, check for need of subsequent operational test.

##### 5.4.1.2 Items to be Demolished

a. For equipment, check whether disassembly is required to enable removal. Ensure doorways, hallways and such that affect removal path are indicated.

b. Check for adequate specified protection requirements for property and people.

c. Permissability of explosives or burning should be specified.

d. In case of concrete, description of reinforcement to be encountered should be indicated.



e. Depth of embedment, required excavation, or required demolition should be specified.

f. In case of part of utility system, method of terminating pipe, etc., to remain should be specified.

g. All items to be removed should be so designated if to remain property of government and turnover procedures should be described.

#### 5.4.1.3 Items to be Removed and Reinstalled

(examples: drapes and curtain rods on window frame to be replaced; furnishings in area to receive new finishes)

a. Check for adequate description of connection and reconnection points.

b. Check for adequate property protection requirements.

c. Check whether contractor must furnish new connecting materials.

#### 5.4.2 Existing Items That New Work Connects to, Adapts to, or Accepts New Work

##### 5.4.2.1 Earthwork and Landscaping

a. Check depiction of all existing trees and shrubs to remain and those to be removed.



b. Check whether new structures come inside drip-line of trees to remain; may not be compatible with tree survival.

c. Check whether new grading and landscaping elevations result in burying existing tree base; may not be compatible with tree survival.

d. Check delineation of limits of grubbing, clearing, landscaping.

e. Check depiction of all valve boxes, manholes, hydrants, etc., and provisions for relocating, elevating, or lowering as required for earthwork and landscaping.

f. Check depiction of existing surface drainage pattern for conflict with new work.

g. Check depicted soil condition and water table information against that encountered previously on other projects.

h. Check depiction of 'natural' site features such as contours, swales, streams, ponds, and all site 'improvements' such as fences, slabs, pavements, sidewalks, etc.





#### 5.4.2.2 Benchmarks

a. Check for actual existance and condition of indicated horizontal and vertical survey control monuments.

#### 5.4.2.3 Pavement and Pavement Marking

a. Check feasibility of proposed method of joining new and old work; consider drainage.

b. Check condition of existing markings to be paved over or re-striped and whether appropriate methods for removal are indicated or specified.

c. Check feasibility of pavement accepting new overlay; consider effect of overlay on intersections, gutters, curbs, drainage, etc.

d. Check depiction of all manholes, valve boxes, etc. and provisions to raise or lower.

e. If pavement is to be recycled or milled, check for description of reinforcement to be encountered if concrete.

f. Especially try to verify if pavement thickness is as indicated.



#### 5.4.2.4 Roofing

a. Check depiction of existing roof penetrations such as access hatch, vents, antennae, pipes, expansion joints, etc. and whether each require new flashing.

b. Check whether new flashing is to match existing flashing in color and size if partial replacement.

#### 5.4.2.5 Exterior Utilities

a. Check for actual availability of indicated existing underground ducts; frequently, urgent repairs result in use of spare ducts.

b. Check depiction of congestion in manholes and handholes to be worked in.

c. Check indication of whether pumping is necessary for work in manholes/handholes.

d. Check for indication of whether some cables in electrical manholes and handholes must remain 'hot' during work.

e. Check for whether splices are to be accomplished on 'hot' cables.

f. Check depiction of area around handholes and manholes as to proximity to traffic, heavy underbrush, etc.



g. In case of expected unclean ducts, check feasibility of specified method of clearing duct, i.e., rodding, high pressure air or water, etc.

h. If precise location of existing underground utility is not known, check for requirements for hand excavation within specified distance of indicated location and/or notice requirements to enable Public Works marking prior to digging.

i. For terminations on poles, check whether room actually exists for such.

j. For installation of pad mounted gear, check provisions for extending existing pad if required.

k. Check depiction of all pavements, curbing, sidewalks, fences, vegetation, landscaping, and other utilities that new underground ducts intersect or traverse and provisions for replacement or renewal upon completion of work.

#### 5.4.2.6 Interior Building Systems

a. For connections to steam, condensate, and insulated domestic lines, verify whether insulation has been checked for asbestos and requirement for special asbestos handling procedures.

b. Check existence of connection points for new to old work; i.e., does the existing really exist.



c. Check requirement for connections to fire extinguishing and fire detection system such as bleeding down procedures, recharging, etc.

d. For new piping and conduit runs in existing spaces, check depiction of all walls and obstructions that runs must pass through and provisions for sleeving and or patching upon completion.

#### 5.4.2.7 Doors, Windows, Vents, Ducts, and Other Wall Penetrations

a. Where occurring in existing walls, check depiction of conduits, ducts, wall reinforcement, etc., to be encountered and provisions for demolition or rerouting.

b. Check for lines not indicated by looking above drop ceiling, below raised flooring, or above top of partition for direction of concealed lines - also check probable routing of lines feeding wall controls, switches, and receptacles.

c. Check for depiction of conflicting wall fixtures such as light switches, power receptacles, intercom boxes, fire alarm components, and such; check whether room exists for door or window frame, duct flange, vent louver frame, etc. outside actual penetration.





d. If wall penetrated for ducts, etc. is in a perimeter wall of a security area, such as a cash room or message center, check for special installation requirements such as bars, and bullet proof door glass.

e. For window replacements, check that windows for bathrooms and such are to receive obscured glass.

#### 5.4.2.8 Floor Tile and V.A.T.

a. Check feasibility of specified removal and preparation procedures for existing surface to be replaced; if procedure such as sandblasting is not specified, check that information is sufficient for bidders to understand difficulty of work.

b. Check feasibility or necessity of matching existing.

#### 5.4.2.9 Field Painting

a. Check feasibility and thoroughness of specified preparation procedures; check for need to strip, sand, primer, etc.

b. Check that scope of work includes all necessary painting in area of work.

c. Ensure depiction of surface material to be painted is properly reflected and that paint specified



is compatible with that material (i.e., metal, CMU, wood, gypboard, etc.)

d. Check that special requirements are reflected such as moisture-resistant paint for showers and kitchen areas.

e. Ensure paint specified is exterior or interior paint as applicable.

f. Check whether existing paint features such as stenciled signs, murals, and wainscots are to be painted over or to remain.

#### 5.4.3 Obstructions

##### 5.4.3.1 Work in Crawl Spaces, Mechanical Rooms, Utility Chases

a. Check for other piping and equipment that could interfere with reasonable access for tradesmen and acceptance of new work.

b. Check for any loose asbestos insulation in the vicinity of new work that could be considered to contaminate the work area.

c. Check for wet conditions that would aggravate work procedures such as welding.

d. Ensure points of access are properly indicated and height limitations noted.



#### 5.4.3.2 Work Above Drop Ceilings

a. Check for proper depiction of obstructions; in the case of a new wall or partition through to roof or next floor, ensure existing ducts, conduits, and cables are described; in the case of a new duct, note if obstructions prevent straight duct runs and tradesman access.

b. If work is in plenum, indicate requirements for temporary closures.

#### 5.4.3.3 Piping, Conduit, and Other System Installations

a. If overhead, ensure ceiling type is properly depicted: gypboard or drop ceilings, with necessary provisions for patchwork.

b. Check for obstructions to specified hanger system for piping if specified wall mounted or roof mounted; check feasibility of indicated hanging height and necessary slopes.

#### 5.4.3.4 Dewatering

a. Check for need of restrictions on drawdown if work is in close vicinity to other structures.



#### 5.4.3.5 Underground Work

a. Bear in mind that the older the area (in terms of the station's development), the more likely there are unexpected obstructions. Look for clues of abandoned underground tanks, utilities, foundations, paving, slabs, railroad tracks, etc.

b. Clues for locating storm drains, sewer lines, water lines, and duct banks would be visual alignment of manholes or catch basins. Another clue is trench indentations in soil or patched over trench cuts in pavement.

c. Consulting with ROICC or PW personnel who possess the 'corporate memory' can be especially fruitful.

#### 5.4.3.6 Overhead Obstructions to Sitework

a. Check for overhead utilities, guy wires, roof overhangs, trees, and antennae signal requirements for potential conflict with contractor operations and access such as use of large equipment including cranes and pile drivers and new construction such as poles and structures.





#### 5.4.3.7 Obstructions in Existing Occupied Spaces

a. Ensure depiction of equipment, furnishings, and fixtures that constrict contractor access and operations or that new work must cut around is correct.

b. Ensure that plans depict those fixtures that do and do not require new flooring underneath or painting behind, such as cabinets or wardrobes that are semi-permanently installed.

c. Check for depiction of overhead obstructions or features in rooms that bear on new work and new work installations such as shower rods in shower to be tiled, and conduits and piping attached to ceiling to be repainted.



GUIDE CHAPTER SIX  
CONTRACTOR SITE REQUIREMENTS

6.1 Discussion

Contract documents should reflect sufficient information about restrictions to contractor site requirements to enable bidders to reasonably estimate costs associated with such restrictions. Restrictions are required to control conflicts with customer operational needs and to establish reasonable limits on contractor use of areas outside the actual project site. Applicable contract general provisions and general paragraphs are typically worded in a non-specific manner, relying on the effect of the words "subject to Contracting Officer approval". Examples are as follows:

All operations of the contractor (including storage of materials) upon Government premises shall be confined to areas authorized or approved<sup>11</sup> by the Contracting Officer. (General Provision 37, 3/81)

Temporary buildings (storage sheds, shops, offices, etc.) may be erected by the Contractor only with the approval of the Contracting Officer . . . (General Provision 37, 3/81)<sup>12</sup>

The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways and use such temporary roadways as may be authorized by the Contracting Officer. (General Provision 37, 3/81)<sup>13</sup>

The Government will make available to the Contractor, from existing outlets and supplies, all reasonably required



amounts of utilities as specified . . . (General Provision 53, 3/81)<sup>14</sup>

Unless the contract documents go into more detail than the above general requirements, it comes down to the ROICC to lay out unexpected restrictions to the contractor. Naturally, the contractor-ROICC relationship suffers when the contractor must absorb costs of unexpected site inefficiencies due to ROICC directed restrictions. As such, contract documents should detail as much as possible any necessary restrictions contractors will ultimately encounter when establishing site organizations. Guidance to satisfy contractor informational needs in the contract documents is provided in the following paragraphs.

## 6.2 Laydown Areas

Consider whether the indicated limits of construction provide sufficient space for trailers, material storage, prefab yards, and operations. If inadequate, first consider designating available space adjacent to the construction area as permissible laydown area. If more laydown area is needed besides that available adjacent to the site, determine location of nearest possible paved area or if necessary, unpaved area. Consider designating separate site for temporary fill and topsoil storage, again indicating location and distance from job site. Avoid having laydown



area across a well traveled road from the job site, or requiring contractor use of base streets for transporting materials to site from storage. Ensure contract provides for contractor to return laydown areas to previous state subsequent to contract completion. Coordinate selection of additional laydown area with Public Works personnel.

### 6.3 Trailers

Determine if customer or Public Works prefer specific location for contractor office or storage trailers. Certain operational areas such as airfields and high visibility areas call for restricting trailer location. Avoid such restrictions if at all possible, but if required, ensure drawings depict the location.

### 6.4 Utilities

Utilities are typically required for construction operations and field offices. Indicate any circuitous connection requirements such as underground or overhead installations of cabling to available power connection points. Coordinate with Public Works for identification of sufficient power from nearest available source. Ensure documents indicate who performs actual connections, who pays for actual connections, and necessary notice requirements.





If contractor connects, indicate any peculiar splicing requirement such as 'hot' splice.

#### 6.5 Parking

For the limited area jobsite, restrictions as to contractor personnel parking should be indicated. Consider whether nearby parking can accomodate the contractor, and if not, the closest permissable parking area.

#### 6.6 Construction Fencing

Check for whether temporary construction site perimeter fencing is included in contract or necessary. Consider type of work involved, quantity of pedestrian traffic in area, and proximity to barracks area. Fencing may prevent material pilferage and resultant contractor delays and reduce safety problems resulting from pedestrians short-cutting across jobsite. Scheduling requirement to require early erection of project permanent fencing may resolve all or some of any fencing needs.

#### 6.7 Haul Route

Check whether contract designates haul route for contracts involving earthwork, paving, concrete, and other work involving heavy truck access to jobsite. If anything



other than the most direct route between the gate and the jobsite and the dump site is required, ensure a haul route preferred by Public Works is reflected on site plan. Considerations of a haul route necessarily should include traffic volume, road width, capacity, likelihood of tracking dirt and mud in undesirable places, and preventing any notion of using housing area streets.



GUIDE CHAPTER SEVEN  
PUBLIC WORKS INTEREST ITEMS

7.1 Discussion

ROICC and Public Works are by necessity and professional responsibility closely related. Often ROICC functions are organizationally under the cognizance of the Public Works Officer. Whether or not ROICC and Public Works are related directly, ROICC reviewers should take the lead to ensure contract documents do not conflict with Public Works' interests.

Public Works' interests center on maintainability and operability, but there are other interrelations to be considered. The ROICC reviewer should coordinate with appropriate Public Works personnel to check that all Public Works interests are satisfied by contract documents.

7.2 Maintainability

All new work must be reasonably maintainable. Particular attention should be accorded to new items of equipment and support systems. Check that contract provides for accessibility to air handlers, air conditioners, fan coil units, chillers, terminal air blenders, filters, heaters, water heaters, valves, controls, etc., such that maintenance and removal of equipment can be reasonably



performed. Roof mounted equipment should have ladder or hatch access; overhead mounted equipment may require catwalks; sump pits require ladders; controls and system components installed in walls and ceilings require access doors. The general requirements of the particular specification section normally detail access doors; plans normally reflect ladders, catwalks, and other features tailored to the particular installation.

On various piping systems, mechanical unions should be specified before and after all items that may need to be removed for repairs or replacement such as valves, filters, etc.

For safety of maintenance personnel, handrails at catwalks and on roofs should be included where needed. At pits, safety railing around pit or grating over pit should be included.

### 7.3 Operability

All new work should satisfy operational needs. After contract work is completed and turned over to the customer, and it is found that certain operational needs are not adequately satisfied, it is Public Works who must rectify the situation.





Check for items such as the height of a new loading dock, the reasonableness of the location of watchstanding and security stations, the location of new sidewalks, and the number of washing machines and dryers for a new barracks building.

#### 7.4 Operation and Maintenance Manuals

Descriptions of manual requirements for mechanical and electrical equipment in Divisions 15 and 16 can usually be found in Section 15011 (Mechanical General Requirements) and Section 16011 (Electrical General Requirements) respectively. Check to ensure other items of equipment such as coiling doors, conveying equipment, and Division 11 equipment are either referenced to applicable 15011 and 16011 manual criteria or have specific manual descriptions within their own section.

Descriptions of manual requirements for various systems are usually located in the particular specification section. Check to ensure manuals are required for systems such as fire detection and alarm systems, conveying systems, HVAC control systems, intercoms, master antenna systems, and any other systems for which operation and maintenance manuals are needed.



### 7.5 Instruction Periods

Check for requirements of instructional periods for all items of equipment and systems. Usually a description of the extent of instructions to be provided by the contractor is described in Sections 15011 and 16011, with the duration of the period described in the particular specification section. Ensure all equipment and systems both in Division 15 and 16 as well as other sections are covered by instructional periods.

### 7.6 Keying System

If Public Works has a base-wide master key system for mechanical rooms of facilities, check keying system requirements of Section 08710 (Finish Hardware) for reflection of such.

### 7.7 Items for Disposal

Determine if any items or components to be demolished and removed are desired by Public Works. Typical items are topsoil, fill, and items of equipment. Specifications should clearly delineate where such materials are to be transported to and any specific notice, scheduling, or turnover requirements. Ensure wording of Section 02050 (Demolition and Removal) reflects any exceptions to the



standard paragraphs as to title of materials to be removed. Check accuracy also of paragraph in General Paragraphs titled "Material and Equipment to be Salvaged".

#### 7.8 Public Works Interface with Contractor Work

Where Public Works is to perform any work in support of the contract (utility connections, outages, marking of utilities), ensure contract reflects adequate notice requirements and necessary contractor preparations that must be completed prior to scheduling. In the General Paragraphs there are normally paragraphs relative to notice requirements for utility interruptions and operating of station utilities. Check to ensure that notice provisions in various utility specifications (02713, Exterior Water Distribution System; 02695, Exterior Steam Distribution; 16301, Underground Electric Work; etc.) do not conflict with General Paragraphs requirements.

#### 7.9 Aesthetic Uniformity

Items sometimes overlooked that the ROICC reviewer should check are various aesthetic considerations such as colors of exterior paint and brick, preformed metal siding shapes and preferences of tree and shrub types in landscaping plans. Ensure Public Works accepts unusual features not common to other base facilities.



GUIDE CHAPTER EIGHT  
CONTRACT DURATION AND TIMING

8.1 Discussion

Contract duration as specified in the General Paragraphs should be checked for reasonableness. Should a contract's duration be found unreasonable, it is typically because the duration is not long enough. This generally occurs because the contract work is needed as soon as possible and the design agency tries to force the completion of the work earlier than practical.

Another factor to consider is the timing of the proposed contract. For the same reasons impractical durations tend to be specified, there may be factors that render projected contract award date and subsequent contract period impractical.

Paragraph 1 of Specification Section 01011 (Additional General Paragraphs), titled "Commencement, Prosecution, and Completion of Work" requires that contract work start usually within 15 calendar days after award (not included in duration) and specifies the contract duration in calendar days.





## 8.2 Contract Duration

Ensure that contract duration provides time for the following listed considerations in addition to actual work performance. When evaluating duration, check whether the various items listed can take place concurrently or sequentially with other items.

1. Administrative Submittals - allow for bonds, insurance, safety plan, Contractor Quality Control plan and other items required before physical work start is allowed.

2. Technical Submittals - Allow for time for contractor to get submittals or shop drawings from suppliers and fabricators, time for Government approvals, and time for mailing to and from.

3. Material Lead Time - Allow time for confirming order, shipping, and delivery to jobsite. Consider long lead materials such as GFE and GFM, transformers, switchgear, air handlers, chillers, and job specific system controls such as panel boxes for power and fire alarm systems. Also consider time for actual fabrications.

4. Weather Delays - Most items of outside work cannot be performed during rainy weather. Consider effect of both rain days and dryout time based on past history for the projected contract period. Cold weather delays work items



such as painting, masonry, concrete, built-up roofing, paving, earthwork, and landscaping for as much as the entire winter. On new facilities and facility additions, in some climates, a delay to getting the roof completed until after winter starts typically delays all other work.

5. Testing and Notice Requirements - Some testing and notice requirements are of a nature that cause dead time. An example is when all new cabling must be installed and approved prior to scheduling an electrical outage for final connections. Typically, 15 days are required to arrange the outage after work approval.

6. Always consider effects of scheduling restrictions such as sequential availability of occupied spaces, activity relocation time, and work stoppage provisions when estimating contract duration.

### 8.3 Contract Timing

The projected award date and when the subsequent contract period occurs should be checked for reasonableness. Consideration should be given to holding off a contract's advertisement so that work does not span long periods of weather that conflicts with the ability to perform the work. This consideration typically applies to contracts of 180 days or less duration with a scope primarily being one of



the following work types: paving, built-up roofing, painting, landscaping, earthwork, concrete, or masonry. Consideration should be given to possible conflicts with other contract work in the area such as an ongoing roofing job conflicting with a proposed exterior painting job.



## GUIDE CHAPTER NINE OTHER AREAS TO CONSIDER

### 9.1 Discussion

This chapter briefly discusses several reviewing considerations primarily the responsibility of technical reviewers. ROICC reviewers, though not directly pursuing such topics, should be aware of them while reviewing their own areas of emphasis and make comments on any associated discrepancies discovered. In the case of a very high priority job, it may be advantageous for the ROICC reviewer to directly pursue these areas of consideration also.

### 9.2 Repetitive Design Details

A seemingly insignificant oversight or error in a description for work occurring many times can result in a very large change order. Repetitive design details, connections, finish work items, etc., should be very closely scrutinized for completeness, feasibility, and clarity. Examples are work items occurring in all rooms or units of barracks and housing contracts, 'typical' connection details, and 'typical' door and window details.

### 9.3 Interdisciplinary Conflicts

A large number of construction document problems are rooted in interdisciplinary incompatibility. Examples are





electrical work conflicting with mechanical work; HVAC ducts conflicting with structural members; structural details conflicting with architectural features. A system to check for such conflicts called REDICHECK was developed by LCDR Bill Nigro in 1979 and recommended for distribution to Architect/Engineer firms for quality assurance guidance by NAVFAC in 1981.

#### 9.4 Conflicts Between Plans and Specifications

There are general provisions that define precedence in cases of conflicts between plans and specifications, however, the conflict should not occur in the first place. Particularly check any dimension and sizes given in the specification for compatibility with depicted uses. Requiring the same thing in both plans and specifications is discouraged. An example would be the cumulative specified thickness of the glazing in an insulated glass window not the same as that indicated in drawn window details.

#### 9.5 Missing Technical Specifications

Check that all items of work in the drawings are covered by applicable specifications. This error most frequently occurs when items of one work trade appear on drawings of another work trade. An example is pipe barriers and concrete pads on electrical drawings. The pipe barriers should be included under Specification Section 05500, Metal



Fabrications, and the concrete should be described in Specification Section 03300, Cast-in-Place Concrete. It may be that the particular item is not covered in the specification section, or perhaps the specification section is missing altogether.

#### 9.6 Missing Support Work

Check for necessary support work not being addressed in either specifications or drawings. Examples are electrical outlets for heating tapes on exterior exposed piping, floor drains for mechanical equipment blow-off or drainage, electrical outlets for phone equipment at communication backboards, dummy door knobs for doors using combination type locks as opposed to common latchsets, and painting on new surfaces.

#### 9.7 Missing or Incorrect Division One Specifications

Ensure specification sections for Contractor Quality Control, Environmental Protection, CPM Network Analysis System, and Testing and Balancing are included when applicable.

#### 9.8 Missing or Incorrect General Paragraphs

Use a guidespec for Sections 01010 and 01011 as a checklist to ensure all applicable paragraphs are included



and editing is complete and acceptable. Particular attention should be given to paragraphs for the following topics not discussed in constructability review guidance in previous chapters of this guide:

- General Intention
- General Description
- Location
- Contractor's Invoice
- Security Requirements
- Liquidated Damages
- Drawings Accompanying Specifications
- Forwarding of Samples and Submittals
- Government Furnished Materials and Equipment
- Navy Construction Representative's Office
- Project Identification Signboard

#### 9.9 Editing of Invitation For Bids

Use a guidespec and guidespec instructions for a checklist to ensure editing is complete and acceptable. Particular attention should be given to paragraphs on Bids and Pre-Site Visitation.

#### 9.10 Miscellaneous P68 Restrictions

Familiarization with Part 4, Section 3 of NAVFAC P68 should be made to enable checking for proper use of performance specifications, 'or equal' specifications, proprietary specifications, and experience clauses.



### 9.11 Typographical Errors

Check for any typographical errors.

### 9.12 Phraseology<sup>15</sup>

1. Under 'Requirements' paragraphs in specifications, do not say 'the work consists of'. Drawings should show scope. If necessary to list certain parts, say 'the work includes'.

2. Do not use 'etc.'.

3. There are only two parties to the contract, the Government and the Contractor. Do not refer to the architect, subcontractors, and owners.

4. Specifications should be clear as to which duct and piping systems require insulation and what type of insulation is required. The phrase 'insulate all ducts except in conditioned spaces' has resulted in claim situations. Similarly, electrical specifications should clearly distinguish as to which type of conduit is used, and piping specifications should be clear as to which type of piping is to be used.

### 9.13 Misuse of Words<sup>16</sup>

1. Do not confuse 'any' and 'all'; e.g., 'Correct any defects' should read 'Correct all defects'.





2. Do not confuse 'either' and 'both'; e.g., 'Paint sheet metal on either side' should read 'Paint sheet metal on both sides'.

3. Do not confuse 'or' and 'and'; e.g., 'It shall be free from defects of workmanship and material which would impair its strength or durability'. The use of 'or' in this sentence results in a meaning not intended.

4. Do not use 'and/or'.

5. 'Provide' is defined in the clause entitled 'Additional Definitions' in the General Provisions as 'furnish and install'. When material or equipment is furnished by the government directly or under other contracts for installation by the contractor, the term, 'install' should be used; however, the contractor may be required to 'provide' foundations, fastenings, etc., for the installation. If the word 'install' is used alone, the bidder has a right to assume that the Government will 'furnish' the materials in question.



14 JUL 1978

## LANTDIV DRAWING AND SPECIFICATION REVIEW COMMENT

5ND LANTDIV 4-4121/4 (6/78)

SHEET

OF

PROJECT					DATE DUE LANTDIV
LOCATION					DATE RETURNED LANTDIV
ARCHITECTURAL		MECHANICAL		PRELIM.	REVIEWER
STRUCTURAL		ELECTRICAL		90% SUBMITTAL	CERTIFICATION OF CO OR OICC/ROICC
CIVIL		SPECS & ESTIMATES		100% SUBMITTAL	DATE LANTDIV RETURN
DWG. NO./ PAR. NO.	ITEM NO.	OICC/ROICC OR STATION COMMENTS (MAKE GENERAL COMMENTS ON LAST SHEET)			LANTDIV REVIEW ACTION - KEY INC. IN LANTDIV TRANS. LTR

CONSTRUCTION SCHEDULE (No. DAYS \_\_\_\_)

SPECIAL REQUIREMENTS (Attach if necessary)

CONCURRENCE \_\_\_\_\_

C.O. or OICC/ROICC SIGN.

SPECIAL REMARKS (For LANTDIV use only)



## REFERENCE LIST

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16. Ibid.

















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